PATENT SPECIFICATION

DRAWINGS ATTACHED

1,193,983

1,193,983

Date of Application and filing Complete Specification: 22 Aug., 1967.
No. 38524/67.
Application made in Germany (No. B88594 IXa/4b) on 23 Aug., 1966.
Application made in Germany (No. B92898 IXa/3b) on 7 June, 1967.
Complete Specification Published: 3 June, 1970.

Index at acceptance:—F4 R5C22G

International Classification:—F 21 m 3/16

COMPLETE SPECIFICATION

Improvements in or relating to Headlamp Units for Motor Vehicles

ERRATUM

SPECIFICATION No. 1,193,983

Page 1, Heading, Application made in Germany, *for* "(No. B92898 IXa/3b)" *read* "(No. B92898 IXa/4b)"

THE PATENT OFFICE
16th November 1970

struction from the filament lamps used hitherto. Therefore, it is necessary to adapt the headlamps to the halogen lamps to be used, in order to provide the optimum optical conditions for the new halogen lamps.

In accordance with the present invention a motor vehicle headlamp unit having a diffusing lens, comprises at least one halogen lamp providing a dipped beam and at least one halogen lamp providing a main beam, the filament of the dipped beam filament lamp being adapted to extend substantially in the direction of the optical axis of a concave reflector and immediately in front of its focal point and an additional reflector being associated with the main beam filament lamp.

In one embodiment of the invention, the main beam filament lamp whose filament extends substantially in the common optical axis of the concave reflector and of the addi-

[*Price 5s. 0d.*]

of this kind the halogen lamps may be used with their longitudinal axis extending parallel with the respective optical axes of the concave reflector and of the additional reflector.

The present invention will now be further described, by way of example, with reference to the accompanying drawings, in which:—

Fig. 1 is the schematic representation of a main beam and dipped beam unit having an additional reflector in the form of a semi-paraboloid below the main lamp and the dipped lamp viewed in the direction of the arrow I of Fig. 2,

Fig. 2 is a section taken along the line II—II of Fig. 1.

Fig. 3 is a view of a main beam dipped beam unit having halogen filament lamps whose filaments extend transversely to the longitudinal direction of the lamp bulb, and having an additional reflector arranged in the lowerpart of the concave reflector and carry-

PATENT SPECIFICATION

DRAWINGS ATTACHED

1,193,983

1,193,983

Date of Application and filing Complete Specification: 22 Aug., 1967.
No. 38524/67.
Application made in Germany (No. B88594 IXa/4b) on 23 Aug., 1966.
Application made in Germany (No. B92898 IXa/3b) on 7 June, 1967.
Complete Specification Published: 3 June, 1970.

Index at acceptance:—F4 R5C22G

International Classification:—F 21 m 3/16

COMPLETE SPECIFICATION

Improvements in or relating to Headlamp Units for Motor Vehicles

We, ROBERT BOSCH GMBH. a German Company, of 4, Breitscheidstrasse, Stuttgart-W, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to a motor vehicle headlamp unit having a diffusing lens, and provided with at least one halogen lamp providing a dipped beam and at least one halogen lamp providing a main beam, which lamps preferably cylindrical quartz bulbs.

The headlamps hitherto used for motor vehicles were provided with filament lamps, particularly two-filament lamps, which are substantially larger than the halogen lamps which are to be used in the subject of the invention. Further, the sockets and the bulbs of the halogen lamps are of different construction from the filament lamps used hitherto. Therefore, it is necessary to adapt the headlamps to the halogen lamps to be used, in order to provide the optimum optical conditions for the new halogen lamps.

In accordance with the present invention a motor vehicle headlamp unit having a diffusing lens, comprises at least one halogen lamp providing a dipped beam and at least one halogen lamp providing a main beam, the filament of the dipped beam filament lamp being adapted to extend substantially in the direction of the optical axis of a concave reflector and immediately in front of its focal point and an additional reflector being associated with the main beam filament lamp.

In one embodiment of the invention, the main beam filament lamp whose filament extends substantially in the common optical axis of the concave reflector and of the additional reflector which is located in the lower part of the concave reflector may be inserted with its upper socket flange inclined towards the side of the adjacent edge of the carriageway, and the additional reflector is in the form of a semi-paraboloid located below the main beam and the dipped beam filament lamps and may cover the lower half of the concave reflector. Alternatively, the main beam filament lamp may be inserted into the additional reflector with its filament extending transversely to the optical axis thereof, the additional reflector having a substantially full parabolic shape and having cut-away portions in its upper part. Instead of using halogen lamps whose cylinder axes extend transversely to the filaments and to the planes of the substantially circular socket flanges, halogen lamps may be used whose cylinder axes extend parallel with the longitudinal axes of the filaments. In headlamps of this kind the halogen lamps may be used with their longitudinal axis extending parallel with the respective optical axes of the concave reflector and of the additional reflector.

The present invention will now be further described, by way of example, with reference to the accompanying drawings, in which:—

Fig. 1 is the schematic representation of a main beam and dipped beam unit having an additional reflector in the form of a semi-paraboloid below the main lamp and the dipped lamp viewed in the direction of the arrow I of Fig. 2,

Fig. 2 is a section taken along the line II—II of Fig. 1,

Fig. 3 is a view of a main beam dipped beam unit having halogen filament lamps whose filaments extend transversely to the longitudinal direction of the lamp bulb, and having an additional reflector arranged in the lowerpart of the concave reflector and carry-

[*Price 5s. 0d.*]

SEE ERRATA SLIP ATTACHED

ing the main lamp, seen in the direction of the arrow III in Fig. 4,

Fig. 4 is a section taken on the line IV—IV in Fig. 3,

Fig. 5 is a view of a main beam and dipped beam unit having halogen filament lamps whose filaments extend in the longitudinal direction of the lamp bulb, and having an additional reflector arranged in the lower part of the concave reflector and carrying the main lamp, seen in the direction of the arrow V in Fig. 6,

Fig. 6 is a section taken on the line VI—VI in Fig. 5.

The headlamp unit illustrated in Figs. 1 and 2 has a concave reflector 1, a diffusing lens 2, and halogen lamps 3 and 4 for the main beam and the dipped beam having cylindrical quartz bulbs 5. The cylinder axes 6 and 7 of these bulbs extend at right angles to the longitudinal directions of the associated filaments 8 and 9 and to the planes of the substantially circular socket flanges 11.

In Figs. 1 and 2 the unit is illustrated in the position in which it is located when fitted in a vehicle. The arrow I points in the direction opposite to the direction of travel of the motor vehicle in which the unit of the invention is fitted. The two halogen lamps are mounted in the concave reflector 1 having the focal point F_H. They are arranged so that the longitudinal directions of their filaments 8 and 9 extend along the optical axis 12 of the concave reflector. Further, the dipped beam filament lamp 4 is arranged so that the cylinder longitudinal axis 7 of the quartz bulb extends at an angle of between 0° and 15°, preferably, 7.5° to the vertical 13, so that the upper socket flange 11 is inclined towards the side of the approaching traffic. The dipped beam filament 9 is located closely in front of the focal point F_H of the concave reflector.

In order that the main beam filament may be arranged immediately in front of the dipped beam filament, the main beam filament lamp 3 is arranged in front of the dipped beam filament lamp 4 so that the two longitudinal axes 6 and 7 of the cylindrical quartz bulbs form an angle of between 45° and 60° preferably 52°. In this manner, the main beam filament lamp is inserted with the socket flange located upwardly and inclined towards the side of the adjacent edge of the carriageway. Further, the filaments 8 of the main beam light is located at the focal point F_Z of an additional reflector 14, the additional reflector 14 being in the form of a semi-paraboloid located below the main beam and dipped beam lights and covering the lower half of the concave reflector 1.

The dipped beam filament lamp 4 has a shield 15 embracing the downwardly extending free end of the quartz bulb 5 of the filament lamp 4 in a cap-like manner. The upper edge 16 of the shield facing the adjacent edge of the carriageway extends in the optical axis 12, whereas the upper edge 17 of the shield facing the side of the approaching traffic is chamfered for producing an asymmetric dipped beam, the chamfered portion forming an angle of about 15° with the horizontal plane passing through the optical axis 12.

The mutually inclined positions of the bulb axes of the main beam and dipped beam filament lamps enable the two filaments to be arranged in close proximity to each other and thus prevent too great a degree of defocusing. The divergence of the main beam reflected by the concave reflector (occasioned by the degree of defocusing nevertheless present) may be compensated for by the diffusing lens which then has to undertake only a degree of correction not exceeding the normal and confined within conventional limits. Thus, together with the portion of the main beam reflected by the additional reflector 14, a good over-all optimum main beam may be obtained.

Figs. 3 and 4 illustrate another embodiment for the application of halogen lamps to main beam and dipped beam headlamps. Here, also, the headlamp unit is illustrated in the position in which it would be fitted in a motor vehicle. The arrow 3 points in the direction opposite to the direction of travel. In the present case, also, the dipped beam filament lamp is arranged so that its cylinder axis 7′ forms an angle of 7.5° with the vertical 13. For the rest, the longitudinal direction of its filament 9′, extends along the optical axis 12′ of the concave reflector 1′, and the filament is located immediately in front of the focal point F_H of the concave reflector.

An additional reflector 18 is provided for the main beam and receives the main beam filament lamp 3′ whose filament extends horizontally through the focal point F_Z of the additional reflector 18 and transversely to the optical axis 19 thereof. The additional reflector 18 is of substantially full parabolic shape and has cutaway portions 21 and 22 in its upper part which are defined by the line joining the points A to E. These cutaway portions are provided out of consideration of the fact that as little as possible of the reflector 1′ shall be shaded from the dipped beam lamp and, at the same time, as much as possible of the light emanating from the main beam lamp shall be picked up by the reflector 1′. More precisely, the main beam enters the upper part of the concave reflector 1′ through the cutaway portions and from there is reflected downwardly on to the carriageway. The dipped beam filament lamp itself is screened from the main beam by the part of the additional reflector 18 defined by the line joining the points B, C, D. This part of the additional reflector 18 has defining edges (projected into a plane extending at right angles to the optical axis of the headlamp) which encircle the optical axis 12′ of the concave reflector above the optical axis 12′. The corresponding projections of the defining edges of the cutaway portions 21 and 22 extend below the optical axis 12′ at a distance therefrom and, on the side of the approaching traffic (corresponding to the line between D and E) form an angle of about 22° with the horizontal and, on the other side (corresponding to the line between A and B), an angle of about 7° with the horizontal.

The additional reflector has a flange-like angled portion 20 in its lower region, by which the additional reflector abuts against the concave reflector in the opening plane 23 thereof extending vertically to the optical axis 12′. For the rest, on each side of the angled portion 20 the additional reflector has a respective strip or plate 24 and 25 which extends beyond the said defining plane 23 into the space enclosed by the covering lens 2′ and increases the reflecting area of the main beam light. This measure, also, enables the light-stream picked up and the reflecting area for the main beam to be increased and thus the main beam to be used to better effect.

In the present case, the focal length of the concave reflector 1′ is 28 mm, and that of the additional reflector 18 is less than 18 mm, so that it is 35% less than focal length of the concave reflector. Even if the reflecting area of the main beam reflector is reduced, this is counteracted by the diminished focal length. The reduced reflecting area is admissible by virtue of the fact that the projected filament images are larger and the main beam does not have to be greatly diffused.

In the present case, the covering cap of the preceding embodiment is replaced by a covering ring 26 which cheapens the construction and is also space-saving and thus affords greater freedom of movement in the construction of the adjacent reflector. For the rest, the upper defining edges of the covering ring are constructed in exactly the same manner as those of the covering cap previously described, i.e. constructed with an edge 27 extending in the horizontal plane extending through the optical axis, and with an oblique edge 28 inclined 15° towards the side of the oncoming traffic.

The covering cap described may be used both in the first and in the second embodiment, in the same manner as the covering ring described.

In the headlamp units described above, halogen lamps were used whose cylinder axes extended transversely to the longitudinal axes of their filaments and to the main planes of their substantially circular socket flanges. However, within the scope of the invention, halogen lamps may be used whose filaments extend parallel with their cylinder axes.

An embodiment of a headlamp unit equipped with halogen lamps of this kind is illustrated in Figs. 5 and 6 and, for the rest, corresponds to the embodiment illustrated in Figs. 3 and 4.

A halogen lamp 32 serving as a dipped beam filament lamp is mounted in the concave reflector 31 of this headlamp unit and the longitudinal direction of its filament extends in the longitudinal direction of the bulb of the filament lamp. The halogen lamp 32 is arranged in the concave reflector 31 so that its socket flange 33 faces the apex of the concave reflector and is there releasably retained by a lamp plate 34. Thus, the halogen lamp 32 is mounted so that the rearmost winding of the filament 35 is located in front of the focal point by only about a third of the diameter of the filament (in contrast to the embodiments known in which the last winding was located more than two filament diameter from the focal point F_H), and the longitudinal axis of the filament 35 (together with the co-axially extending shield 36) is displaced parallel with the optical axis and towards the side of the oncoming traffic by an amount corresponding substantially to the diameter of the filament, and upwardly out of the optical axis O—O of the concave reflector 31 by an amount corresponding to about a third of the diameter of the filament. This displacement of the axial filament upwardly and towards the side of the approaching traffic and, at the same time, the least possible forward displacement of the filament from the focal point ensures a substantially adequate concentration of light on specific important points on the side of the carriageway below the light-dark limit even without a diffusing lens. The desired concentration of light could not be obtained with the filaments in the known arrangements which were displaced further forwards from the focal point in the direction of the optical axis. Thus, it was necessary to obtain the desired light concentration below the light-dark limit by the special construction at least of specific regions of the diffusing lens. Nevertheless, critical dazzle zones occurred particularly in headlamps of small diameter, since the many different high prism steps cannot always be accurately constructed during glass pressing. Further, great light losses occur at every prism step by virtue of the transition flaws arising during the glass pressing process of the lens.

These difficulties can be overcome by the new arrangement of the filaments, especially since a large part of the diffusing lens thereby does not require to be provided with prisms in the hitherto conventional manner, since, by virtue of the displaced arrangement of the axial filament, the light from the reflector may be better concentrated than previously in predetermined regions.

It a further profiling is at all necessary, particularly of the asymmetric sectors in the diffusing lens the prisms which are somewhat difficult to realise by tool techniques may be replaced by vertically extending diffusing corrugations which are simpler and thus capable of more accurate manufacture.

The dipped beam filament lamp 32 is also provided with a shield 36 in the embodiment of Figs. 5 and 6. The upper part of the shield 36 in its rearward region facing the apex of the concave reflector 31 is of cylindrical construction and the lower part rectangular, and these parts are arranged substantially concentrically to the longitudinal axis of the filament 35. The upper cylindrical part of the shield 36 is absent in the region of the filament 35. The part of the shield 36 extending only below the filament 35 in this region is cut away towards the side of the approaching traffic, so that its upper edge 39 extending below the optical axis O—O extends in a plane in which the optical axis O—O also lies and which forms an angle of about 19° with a horizontal plane. On the other hand, the edge 41 of the shield 36 remote from the approaching traffic extends in a horizontal plane located above the optical axis O—O by an amount corresponding to a sixth of the diameter of the filament 35.

Therefore, as previously described, the rearward region 37 of the shield 36 is constucted in the shape of a closed frame and arranged so that it prevents light interference from reaching the places around the apex of the concave reflector whose illumination would cause the light interference to have a particularly great effect on the dazzle by the oblique projection of the lamp and for example, by flaws in the reflector throat.

The shield is arranged concentrically with the filament. The defining edge 45 of the shield 36 at the transition from its closed part to its front part extending below the filament extends in such an oblique plane 45 and at such a distance from the apex of the concave reflector that the places on the concave reflector adjacent to the apex are not illuminated. However, since the filament and the shield do not extend concentrically to the optical axis, the defining edge 45 describes a curve on the concave reflector.

The second halogen lamp 42 serving as the main beam filament lamp is mounted in an additional reflector 43 corresponding to the additional reflector 18 illustrated in Fig. 4. Although the main beam filament lamp 42 is inserted in exactly the same manner as the main beam lamp in Fig. 4, in the present case, as a consequence of the special construction of the halogen lamp 42, the longitudinal direction of its main beam filament 44 extends in the optical axis of the additional reflector and intersects the focal point F_2 of the additional reflector 43.

The headlamp units illustrated in Figs. 3 to 6 could (within the scope of the invention) be of alternative construction, so that the additional reflector for the main beam is arranged outside the concave reflector for the dipped beam and constructed as a fully parabolic reflector.

The embodiments of the headlamp units according to the present invention previously described are obviously for use on motor vehicles which are adapted to drive on the right-hand side of the road, but, as will be obvious to anybody familiar with the art, the invention can easily be adapted to be utilised on motor vehicles which travel on the left-hand side of the road.

WHAT WE CLAIM IS:—

1. A motor vehicle headlamp unit having a diffusing lens and comprising at least one halogen lamp providing a dipped beam and at least one halogen lamp providing a main beam, the filament of the dipped beam filament lamp being adapted to extend substantially in the direction of the optical axis of a concave reflector and immediately in front of its focal point and an additional reflector being associated with the main beam filament lamp.

2. A unit as claimed in claim 1 wherein said additional reflector is located in the lower part of the concave reflector, and said reflectors have cylindrical halogen lamps whose axes extend transversely to the filaments and to the planes of the substantially circular socket flanges of the lamps.

3. A unit as claimed in claim 2 wherein the dipped beam filament lamp is inserted with the socket flange located upwardly and inclined towards the side of the approaching traffic, and the longitudinal axis of the dipped beam filament lamp forms an angle of 0° to 15°, preferably 7.5° with the vertical.

4. A unit as claimed in claim 1 or 2 or 3, in which the dipped beam filament lamp has a shield whose edge producing the light-dark boundary is located at least partially at the level of the optical axis of the concave reflector.

5. A unit as claimed in claim 4 for an asymmetric dipped beam, in which the shield of the halogen lamp has a chamfered portion towards the side of the approaching traffic and forming an angle of about 15° with the horizontal plane through the optical axis.

6. A unit as claimed in claims 4 and 5, in which the shield embraces the downwardly extending free end of the quartz bulb of the lamp in a cap-like manner.

7. A unit as claimed in claim 4 or 5, in which the shield is of circular construction.

8. A unit as claimed in any one of claims 1 to 7, in which the main beam filament lamp is fitted in front of the dipped beam lamp end its filament is located substantially at the focal point of the additional reflector.

9. A unit is claimed in any one of claims 1 to 8, in which the filament of the main beam filament lamp extends substantially in the common optical axis of the concave reflector and of the additional reflector and the lamp is inserted with the socket flange located upwardly and inclined towards the side of the adjacent edge of the carriageway, the additional reflector being in the form of a semi-paraboloid located below the main beam lamp and the dipped beam lamp and covering the lower half of the concave reflector.

10. A unit as claimed in claim 9, in which the angle between the projections of the longitudinal axes of the dipped beam filament lamp and of the main beam filament lamp amounts to 45° to 60°, preferably 52°, in a plane extending transversely to the optical axis.

11. A unit as claimed in claims 1 to 9, in which the main beam filament lamp has a filament extending transversely to the optical axis of the additional reflector and is inserted into the additional reflector which is substantially of full parabolic shape having cutaway portions in its upper part.

12. A unit having a concave reflector, an additional reflector, and halogen lamps as claimed in claim 1, wherein the axes of the cylindrical halogen lamps each extend parallel with the respective filaments and transversely to the planes of the substantially circular socket flanges of the lamp.

13. A unit as claimed in claim 12, wherein the halogen lamps are inserted with the socket flanges facing the apices of the respective associated concave reflector and additional reflector and with the bulb axes extending parallel with the optical axes of the respective concave reflector and additional reflector.

14. A unit as claimed in claims 12 and 13, wherein the dipped beam filament has a closed shield of partially annular or frame-like construction and the said longitudinal axis of the filament is upwardly displaced out of and parallel with the optical axis of the concave reflector and towards the side of the approaching traffic.

15. A unit as claimed in claim 12, 13 or 14 in which the dipped beam filament is mounted so that the rearmost winding of the filament is located only a third of its diameter in front of the focal point.

16. A unit as claimed in claim 14 or 15, in which the filament and the shield are displaced towards the side of the approaching traffic by about the diameter of the filament and upwardly by about a third of the diameter of the filament.

17. A unit as claimed in claims 14 to 16, in which only the rear part of the shield facing the apex of the concave reflector is annular or frame shaped and extends to the region of the rearmost winding of the filament, whereas the front part of the shield extends substantially below the filament so that its upper edge facing the side of the approaching traffic and extending below the optical axis is located in a plane which passes through the optical axis and forms an angle of about 19° with the horizontal, and its other upper edge facing away from the approaching traffic extends about one sixth of the filament diameter above the optical axis and parallel therewith.

18. A unit as claimed in claim 17, in which one defining edge of the shield at the transition from its annular or frame-shaped closed part to the front part extending only below the filament extends in such an oblique plane and at such a distance from the apex of the parabolic concave reflector that the places adjacent to the apex on the concave reflector are not illuminated.

19. A unit as claimed in claims 12 to 18, in which the main beam filament lamp is inserted into the additional reflector with the longitudinal axis of the filament extending in the optical axis of the additional reflector, which additional reflector is substantially in the shape of a full paraboloid having cutaway portions in its upper part.

20. A unit as claimed in claim 11, in which the focal length of the additional reflector is preferably at least 35% less than that of the concave refletcor.

21. A unit as claimed in claim 11 or 20, in which the projection of the defining edges of the cutaway portions on to a plane vertical to the optical axis of the additional reflector encircles the optical axis of the concave reflector thereabove, and has lines below the optical axis at a distance therefrom forming an angle of about 22° with the horizontal on the side of the approaching traffic and an angle of about 7° on the other side.

22. A unit as claimed in claim 20 or 21, in which the additional reflector has a flange-like angled portion in its lower region with which it abuts against the concave reflector in the latter's opening plane extending vertically to the optical axis and has on each side of the angled portion a strip or plate extending beyond the said plane into the space enclosed by the diffusing lens which strips or plates increases the reflecting surface of the main beam light.

23. A headlamp unit constructed and arranged and adapted to be used substantially as hereinbefore particularly described with

reference to and as illustrated in Figs. 1 and 2, or Figs. 3 and 4, or Figs. 5 and 6 of the accompanying drawings.

W. P. THOMPSON & CO.
12, Church Street, Liverpool, 1.
Chartered Patent Agents.

Printed for Her Majesty's Stationery Office, by the Courier Press, Leamington Spa, 1970.
Published by The Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

BEST AVAILABLE COPY

BEST AVAILABLE COPY

Fig.1

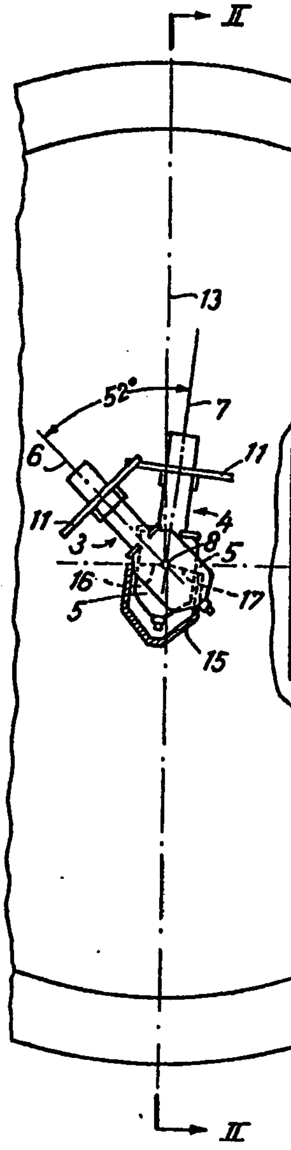


Fig.2

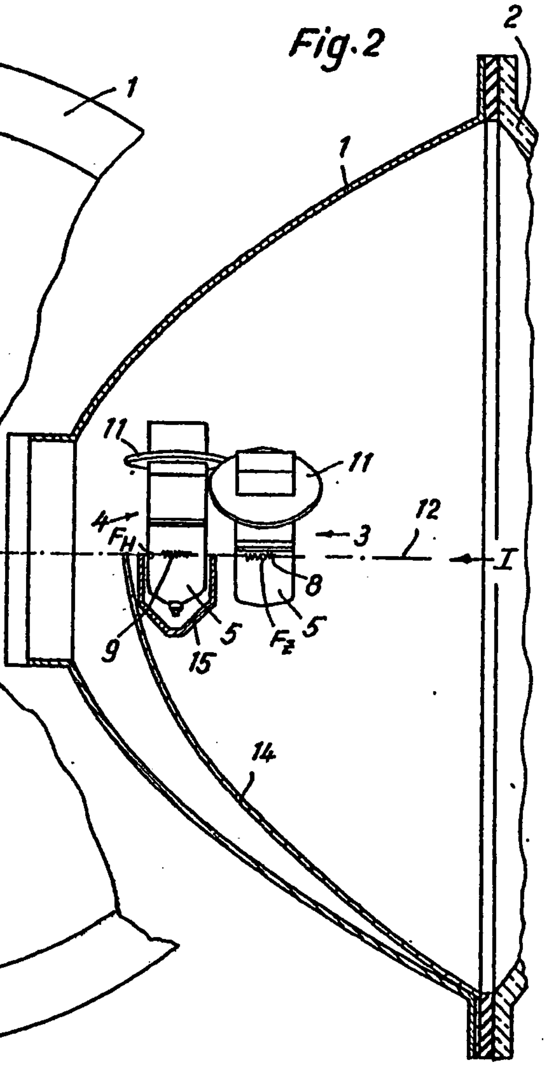
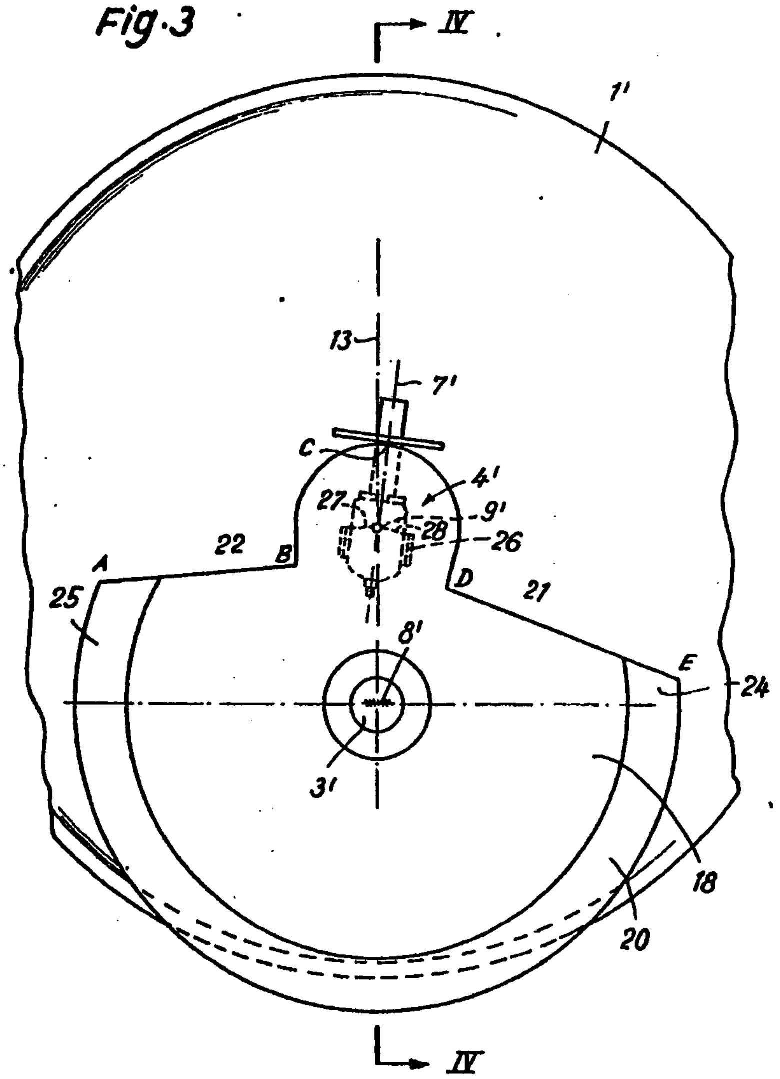


Fig. 3



BEST AVAILABLE COPY

Fig.4

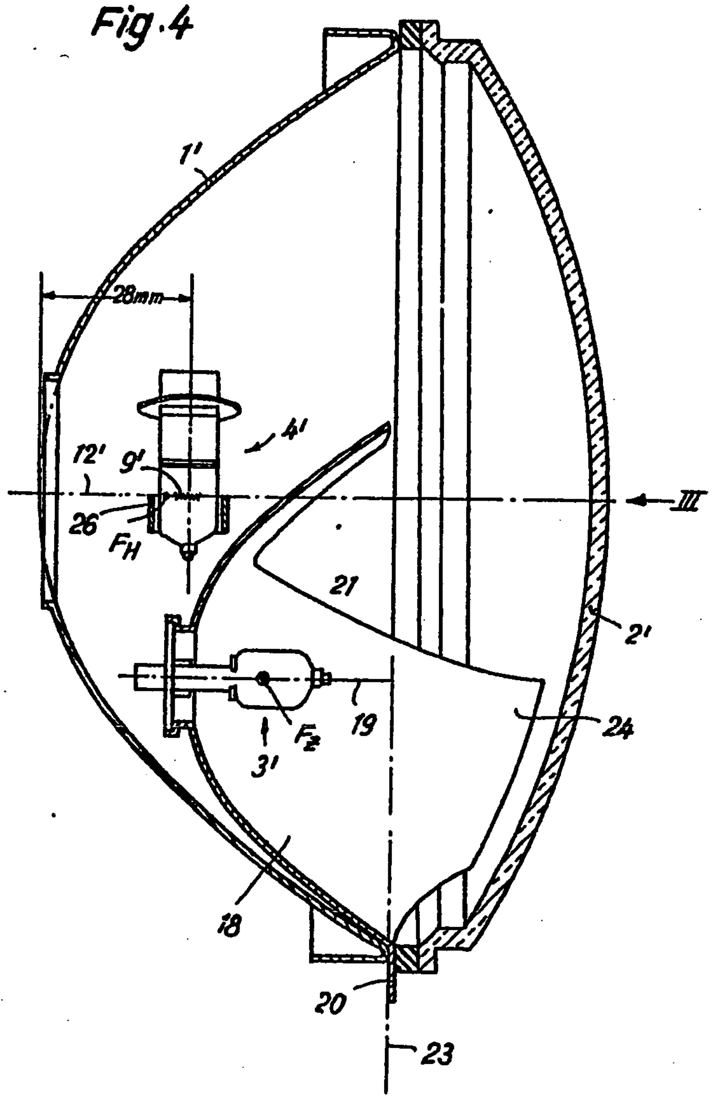
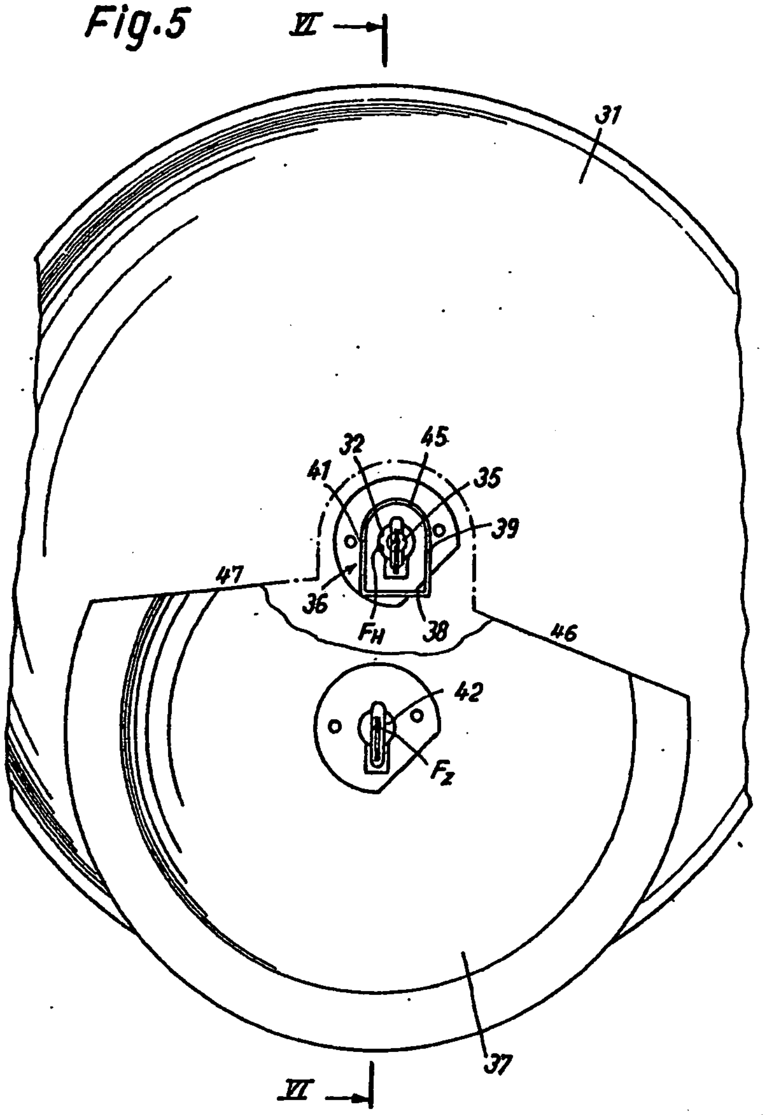
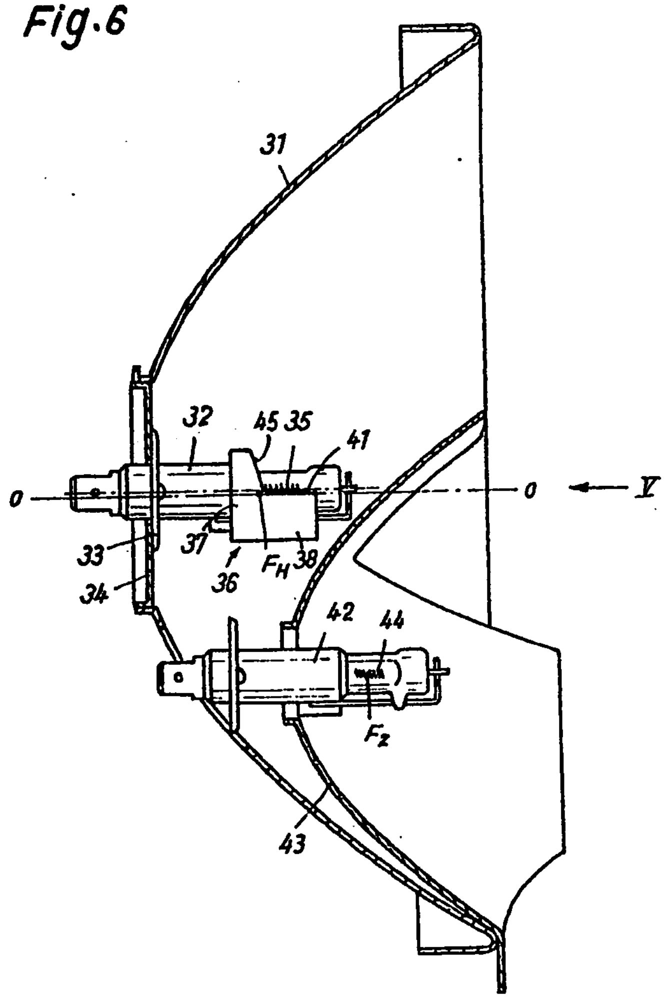


Fig. 5



BEST AVAILABLE COPY

Fig. 6



BEST AVAILABLE COPY

THIS PAGE BLANK (USPTO)